Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claim 1 (Currently Amended): A dual-purpose sensor comprising:

a magnetoresistive current sensor having a single pair of terminals; and

a conductor adjacent to the magnetoresistive current sensor, the conductor being exposed to separate current conditions,

wherein the sensor is ~~being~~ multiplexed under the separate current conditions in the conductor ~~a conductor adjacent to the sensor~~ to produce both a temperature measurement ~~and a current measurement~~ in a vicinity of the sensor and a current measurement associated with the conductor.

Claim 2 (Currently Amended): The dual-purpose sensor of Claim 1, wherein the temperature measurement and the current measurement are determined with respect to separate currents flowing in the adjacent conductor, the separate currents representing the separate current conditions.

Claim 3 (Original): The dual-purpose sensor of Claim 1, wherein the separate current conditions comprise a first condition where a current flowing through the adjacent conductor has a value known *a priori*, and a second condition where a current flowing through the adjacent conductor has an unknown value.

Claim 4 (Original): The dual-purpose sensor of Claim 3, wherein a first resistance is measured across the single pair of terminals during the first condition to produce the temperature measurement.

Claim 5 (Original): The dual-purpose sensor of Claim 3, wherein a second resistance is measured across the single pair of terminals during the second condition to produce the current measurement in the adjacent conductor.

Claim 6 (Currently Amended): A dual-purpose sensor comprising:

a magnetoresistive current sensor having a single pair of terminals; and

a current flowing adjacent to the sensor,

wherein the sensor is ~~being~~ multiplexed to produce both a temperature measurement in a vicinity of the sensor and a current measurement ~~in a conductor~~ of the current adjacent to the sensor from separate resistance measurements made across the single pair of terminals, the multiplexing being associated with separate current conditions of the adjacent current under which the resistance measurements are made.

Claim 7 (Currently Amended): The dual-purpose sensor of Claim 6, wherein the separate resistance measurements comprise a first resistance measured across the single pair of terminals while a first current condition of the adjacent current is an *a priori* known current. ~~flowing in the adjacent conductor is known *a priori*,~~ and a second resistance measured across the single pair of terminals while a second current condition of the adjacent current is an unknown current. ~~a current flowing in the adjacent conductor is unknown.~~

Claim 8 (Original): The dual-purpose sensor of Claim 7, wherein the measured first resistance is used to produce the temperature measurement, the measured second resistance being used to produce the current measurement.

Claim 9 (Original): The dual-purpose sensor of Claim 7, wherein the *a priori* known current is essentially zero amperes.

Claim 10 (Original): The dual-purpose sensor of Claim 6, wherein the magnetoresistive sensor is a giant magnetoresistive sensor.

Claim 11 (Withdrawn): The dual-purpose sensor of Claim 6, wherein the magnetoresistive sensor is an anisotropic magnetoresistive sensor.

Claim 12 (Withdrawn): A sensor system that produces a current measurement and a temperature measurement comprising:

means for sensing current magnetoresistively,

means for measuring resistance in the current sensing means, and

means for controlling a current in a conductor adjacent to the current sensing means, wherein the controlling means multiplexes the current sensing means to produce the temperature measurement in a vicinity of the sensor and the current measurement of the current in the adjacent conductor.

Claim 13 (Withdrawn): The sensor system of Claim 12, wherein the controlling means provides separate current conditions in the adjacent conductor, such that the sensor system produces the temperature measurement and the current measurement under respective ones of the separate current conditions using the current-sensing means and the resistance measuring means.

Claim 14 (Withdrawn): A sensor system that provides current and temperature measurements comprising:

a magnetoresistive current sensor adjacent to a conductor;

a resistance sensing subsystem connected to a single pair of terminals of the current sensor; and

a controller connected to control current flowing in the conductor.

Claim 15 (Withdrawn): The sensor system of Claim 14, wherein the controller controls a current flowing in the conductor during separate current conditions, the resistance sensing subsystem measuring a resistance across the single pair of terminals of the current sensor in response to the current flowing in the conductor during the separate current conditions.

Claim 16 (Withdrawn): The sensor system of Claim 15, wherein the controller is connected to a subsystem output of the resistance sensing subsystem, the controller comprising a computer program that, when implemented, converts the resistance measurement from the subsystem output into either a temperature measurement or a current measurement depending on the current condition.

Claim 17 (Withdrawn): The sensor system of Claim 15, wherein the controller sets the current flowing in the conductor to a known current value in a first current condition, while the resistance sensing subsystem measures a first resistance of the current sensor, such that the sensor system produces a temperature measurement in a vicinity of the current sensor.

Claim 18 (Withdrawn): The sensor system of Claim 15, wherein the controller allows the current flowing in the conductor to have an unknown current value in a second current condition, while the resistance sensing subsystem measures a second resistance of the current sensor, such that the sensor system produces a current measurement of the unknown current value in the conductor.

Claims 19-23 (Cancelled).

Claim 24 (New): A dual-purpose sensor comprising:

means for sensing current magnetoresistively; and

means for controlling a current in a conductor adjacent to the current sensing means,

wherein the controlling means provides separate current conditions for the current in the conductor, such that the current sensing means produces a temperature measurement and a current measurement under respective ones of the separate current conditions using a resistance of the current sensing means.

Claim 25 (New): The dual-purpose sensor of Claim 24, wherein the current sensing means is a giant magnetoresistive sensor.

Claim 26 (New): The dual-purpose sensor of Claim 24, wherein the separate current conditions comprise a first current that is known *a priori* and separately a second current that is unknown.

Claim 27 (New): The dual-purpose sensor of Claim 26, wherein the temperature measurement is produced by measuring the resistance of the current sensing means while the *a priori* known current flows in the conductor, and wherein the current measurement is produced by measuring the resistance of the current sensing means while the unknown current flows in the conductor.

Claim 28 (New): The dual-purpose sensor of Claim 24, wherein the separate current conditions comprise a first current condition and a second current condition, the first current condition corresponding to the controlling means allowing a current having an *a priori* known value to flow in the conductor, the second current condition corresponding to the controlling means allowing a current having an unknown value to flow in the conductor.

Claim 29 (New): The dual-purpose sensor of Claim 28, wherein a measurement of the resistance during the first current condition provides the temperature measurement, and wherein a measurement of the resistance during the second current condition provides the current measurement, the current measurement corresponding to the unknown current value.

Claim 30 (New): The dual-purpose sensor of Claim 24, wherein the controlling means is a switch that selectively connects the conductor to a source of a first current having an *a priori* known value and a source of a second current having an unknown value to provide the separate current conditions.

Claim 31 (New): A dual-purpose sensor comprising:

a magnetoresistive current sensor adjacent to a conductor; and

a current controller connected to control current flowing in the conductor under separate current conditions,

wherein a resistance of the current sensor during a first of the separate current conditions corresponds to a temperature in a vicinity of the current sensor, a resistance of the current sensor during a second of the separate current conditions corresponding to an amount of the flowing current.

Claim 32 (New): The dual-purpose sensor of Claim 31, wherein the current controller comprises a switch that alternately connects a first current source to the conductor and a second current source to the conductor, a value of the flowing current of the first current source being known.

Claim 33 (New): The dual-purpose sensor of Claim 31, wherein under the first condition the current controller sets the flowing current to a known value to provide a measurement of the temperature according to an *a priori* relationship between resistance and temperature, and wherein under the second condition the current controller sets the flowing current to an unknown value to provide a measurement of the amount of the flowing current according to an *a priori* relationship between resistance and current.

Claim 34 (New): A dual-purpose sensor comprising:

a magnetoresistive current sensor; and

a controllable current flowing adjacent to the sensor, the current being controlled to provide a known value and an unknown value for the current,

wherein a resistance of the current sensor measured during the controlled known current value corresponds to a temperature in a vicinity of the current sensor and a resistance of the current sensor measured during the controlled unknown current value determines a measurement of the unknown current value.